REL INDUSTRIAL LTD.

M700 SERIES
PROGRAMMABLE POWER SUPPLIES

Operating Manual

M700 SERIES PROGRAMMABLE POWER SUPPLIES

M700 OPERATING MANUAL

TYPE M700 I 04 SERIAL No. 2121

MAINS SUPPLY 240 V 50 Hz

RELAY OPERATING VOLTAGE 5 V

LOGIC VOLTAGE 5 V

'1' Active

'0' Active

OPTION 10 FULL SCALE OUTPUTS:

Range 1 _____ V

Range 2 _____ V

Range 3 _____ V

Range 4 _____ V

OTHER OPTIONS: 04, 06, 07

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SECTION 1 : INTRODUCTION

The M700 series is a series of power supplies designed for the field of Automatic Test Systems as power supplies, D.C. Stimulii or low frequency function generators.

The M700 power supply is rated at 50 V.A., but for higher power outputs the M800 (100 V.A.) and M900 (250 V.A.) are available. These power ratings apply over the temperature range $0 - 55^{\circ}C$.

M700 supplies are compatible with most systems, since either binary or B.C.D. of practically any logic levels can be accommodated, in addition the supplies are designed to work into up to 20 foot power leads.

M700 supplies are accurate, even at low output levels; the 1% or 0.1% accuracies apply to any output level.

M700 supplies are fast: response times of 500uS for voltages units (to within 1% of demanded output) and 1mS for current units (to within ½ l.s.b.) without overshoot, eliminate time wasted waiting for the supply to settle.

M700 supplies are unaffected by line and load variations; 0.01% line regulation, and 1 milliohm D.C. output impedance (voltage units) or 500 kilohms (current units) ensure the correct voltage or current is at the load.

M700 supplies are designed for minimum down-time:– fault diagnosis can be carried out to a certain extent without even removing the cover, and faults can be cleared with spare board replacement.

SECTION 2 : SPECIFICATIONS

2:1 General specifications for Standard M700.

AC Power Input	:	240 Volts 45–55 Hz.
Relay functions	:	Power off/on, Main output/dummy output by isolated contact relay, coil 5V 100mA
Programming	:	logical 1 +2.4 to +6V logical 0 zero to +0.8V
Amplitude programme	:	1% binary increments by 7 lines (information can be stored)
Limit Control	:	internal pre-set control

2:2 Options available: as requested by the customer.

01 : AC power input 190–260, 95–150 V 45–55, 380–420 Hz single, or three-phase.

02 : amplitude information 1% BCD increments by 8 lines.

03 : amplitude information 0.1% binary increments (10 lines).

04 : amplitude information 0.1% BCD increments (12 lines).

05 : programmable limit 1% binary increments (7 lines).

06 : programmable limit 1% BCD increments (8 lines).

07 : polarity change by relay (not stored)

08 : Polarity change solid state (normally not stored)

09 : local/remote sensing by relay (not stored)

10 : four ranges of full scale output (solid state, 2 lines)

11 : relay coils 24–30V, 30mA.

12 : programme levels any level between -100 and +100 volts, positive or inverse logic.

2:3 Electrical characteristics:

Accuracy (at 23°C)

Amplitude : 1% units, +/– 0.75% demand +/– 0.005% FSD.
0.1% units, +/– 0.075% demand +/– 0.005% FSD.
Limit (options 05/05) +/– 0.75% demand +/– 0.5% FSD.

Temperature coefficient: of amplitude:
1% units, 100ppm +/– 2ppm of FSD/deg.C.
0.1% units, 30ppm of FSD/deg.C.

Output impedance: DC. 1 milliohm (voltage) max.
500 kilohms (current) min.
at 100KHz 250 milliohms (voltage) max.
15 ohms (current) min.

Ripple and noise (full output, 10% low mains) DC–10MHz.
Less than 10mV p-p or 0.2% of maximum output p-p.
Less than 0.1% of maximum output for current units.

Response time: less than 500uS 0–99% output demand
current units: less than 1mS to within ½ l.s.b.

Recovery time: for a step change from zero output to full output due to the load, the output will recover to within 1% of its demand output within 1mS.

Current Limit speed: under short circuit conditions.

a) standard unit, the current available from the unit will return from an unspecified value to within twice the rated output of the unit within 5uS, and be controlled within 1mS to the limit set.

b) option 08. the current available from the unit will be within the set limit within 5uS.

c) option 05/06: the current available from the unit will return from an unspecified value to within twice the rated output of the unit within 10uS, and be at the programmed limit within 150μS.

d) option 05/06 and 08: the current available from the unit will return from an unspecified value to within twice the rated output of the unit within 10μS, and will be at the programmed limit within 1mS.

Current limit; marginal overloads:

under marginal overloads (1% above programmed limit):

a) option 05/06: the current will be controlled to the programmed level within 1:5mS.

b) option 05/06 and 08: the current will be controlled within 10mS and at the limit programmed within 20mS.

Voltage limit speed: under transient open circuit conditions, the voltage available from a current unit will be limited within 10μS, and will be at the programmed limit within 150μS.

Isolation: The mains input, power output, programme input, chassis and relay coils are isolated from each other, and the degree of isolation is 500V (less than 20μA at 750V).

Operating temperature: 0 to +55°C, storage;−10 to +70°C.

Dimensions: 5"h. 15"d. $^{1}/_{3}$ 19" rack width. 18lb. weight.

SECTION 3

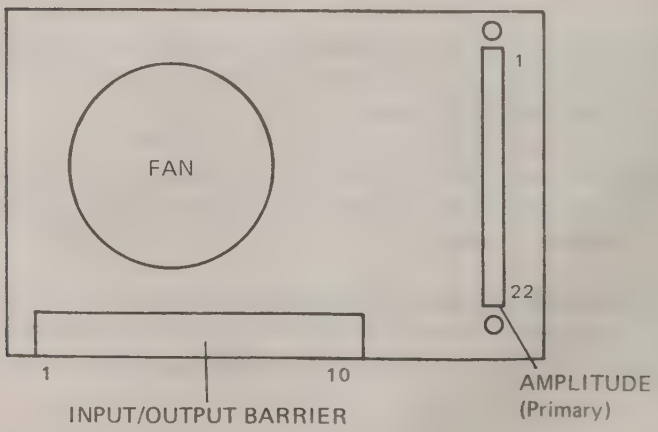
3:1 Connections without option 05/06

There are two connectors on M700 units without programmable current limit; these are (1) the programme connector and (2) the power input/output terminal barrier.

1. The programme connector is a 22 way 0.156" pitch edge connector, of which the bottom connections are not used, except for location purposes.

2. The barrier terminal is a 10 position terminal, for which a 10 way fanning strip is available.

The connections to these connectors is given in the following tables.



PROGRAMME CONNECTOR

A	Programme common	1	Prog. 12
B	Prog. 1	2	N.C.
C	Prog. 2	3	N.C.
D	Override Zero	4	N.C.
E	Address	5	N.C.
F	Prog. 3	6	N.C.
H	Prog. 4	7	N.C.
J	Prog. 5	8	N.C.
K	Prog. 6	9	N.C.
L	Prog. 7	10	N.C.
M	Prog. 8	11	N.C.
N	Prog. 9	12	+15V monitor
P	Prog. 10	13	+10V reference monitor
R	Prog. 11	14	−15V monitor
S	No connection	15	Analogue power ground
T	N.C.	16	Monitor ground
U	N.C.	17	Polarity change (07/08)
V	5V Vcc. monitor	18	D/A converter monitor
W	Power relay +Ve	19	Relay common −Ve
X	Current limit ind.	20	Current monitor +Ve
Y	Dummy relay +Ve	21	Current monitor −Ve
Z	N.C. Locating Key	22	N.C. Locating Key

INPUT/OUTPUT POWER TERMINAL BARRIER

1	+Ve sense	6	+Ve dummy output
2	+Ve power	7	AC line (phase 1)
3	−Ve power	8	AC Neutral (phase 2)
4	−Ve sense	9	N.C. (phase 3)
5	--Ve dummy output	10	Chassis Ground

The significance, in terms of output amplitude, of the programme lines is listed in the following table:

PROGRAMME LINE SIGNIFICANCE

PROGRAMME LINE	PERCENTAGE OF FULL SCALE			
	standard	option 02	option 03	option 04
1	1	–	0.1	0.1
2	2	–	0.2	0.2
3	4	–	0.4	0.4
4	8	–	0.8	0.8
5	16	1	1.6	1
6	–	2	3.2	2
7	32	4	6.4	4
8	–	8	12.8	8
9	–	10	25.6	10
10	–	20	–	20
11	–	40	–	40
12	64	80	51.2	80

3:2 CONNECTIONS TO THE UNIT (WITH OPTION 05/06)

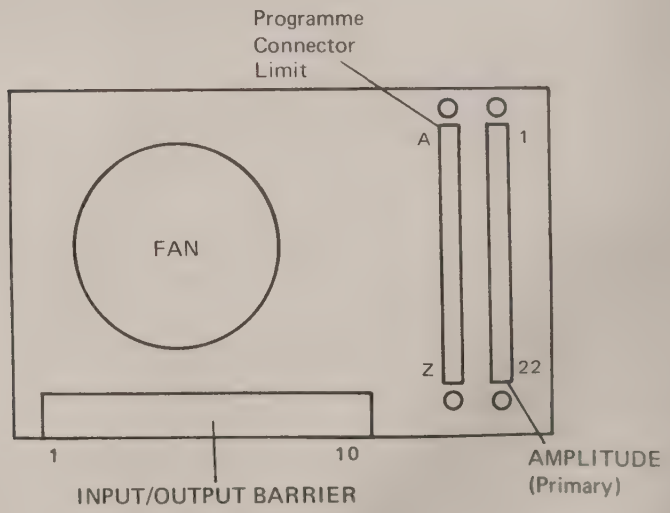
There are three connectors on M700 units with programmable limit facilities; these are:

(1) the primary programme connector
(2) the limit programme connector
(3) the power input/output terminal

1, 2, the programme connectors are 22 way 0.156" pitch edge connector, of of which the bottom connector is not used, except for location purposes.

3, the input/output connector is a 10 way screw barrier terminal, for which fanning strips are available.

The connections to these connectors is given in the following tables.



PRIMARY PROGRAMME CONNECTOR

A	Programme common	1	Prog. 12
B	Prog. 1	2	N.C.
C	Prog. 2	3	N.C.
D	Override zero	4	N.C.
E	Address	5	N.C.
F	Prog. 3	6	N.C.
H	Prog. 4	7	N.C.
J	Prog. 5	8	N.C.
K	Prog. 6	9	N.C.
L	Prog. 7	10	N.C.
M	Prog. 8	11	N.C.
N	Prog. 9	12	+15V monitor
P	Prog. 10	13	+10V reference monitor
R	Prog. 11	14	−15V monitor
S	No connection	15	Analogue power ground
T	N.C.	16	monitor ground
U	N.C.	17	N.C.
V	5V Vcc. monitor	18	D/A monitor
W	N.C.	19	N.C.
X	N.C.	20	N.C.
Y	N.C.	21	N.C.
Z	N.C. Locating Key	22	N.C. Locating Key

POWER INPUT/OUTPUT CONNECTOR

1	+Ve sense	6	+Ve dummy output
2	+Ve power	7	AC Line (phase 1)
3	−Ve power	8	AC Neutral (phase 2)
4	−Ve sense	9	N.C. (phase 3)
5	−Ve dummy output	10	Chassis Ground

LIMIT PROGRAMME CONNECTOR

A	Programme common	1	Prog. 8
B	Prog. 1	2	N.C.
C	Prog. 2	3	N.C.
D	Override Zero	4	N.C.
E	Address	5	N.C.
F	Prog. 3	6	N.C.
H	Prog. 4	7	N.C.
J	Prog. 5	8	N.C.
K	Prog. 6	9	N.C.
L	Prog. 7	10	N.C.
M	Override 100% (06)	11	N.C.
N	Polarity (07, 08)	12	N.C.
P	Range prog. 1 (10)	13	N.C.
R	Range prog. 2 (10)	14	N.C.
S	N.C.	15	N.C.
T	N.C.	16	Monitor ground
U	N.C.	17	N.C.
V.	N.C.	18	Limit D/A monitor
W	Power Relay +Ve	19	Relay common –Ve
X	Current lim. ind.	20	Current monitor +Ve
Y	Dummy relay +Ve	21	Current monitor –Ve
Z	N.C. Locating Key	22	N.C. Locating Key

The significance, in terms of amplitude or limit value, of the programme lines is listed in the following table.

PROGRAMME LINE SIGNIFICANCE: PERCENTAGE OF FULL SCALE

Prog.	Primary Standard	Connector Op. 02	Op. 03	Op. 04	Limit 05	Connector 06
1	1	–	0.1	0.1	1	1
2	2	–	0.2	0.2	2	2
3	4	–	0.4	0.4	4	4
4	8	–	0.8	0.8	8	8
5	16	1	1.6	1	16	10
6	–	2	3.2	2	32	20
7	32	4	6.4	4	–	40
8	–	8	12.8	8	64	80
9	–	10	25.6	10		
10	–	20	–	20		
11	–	40	–	40		
12	64	80	51.2	80		

3:3 Notes on connections to the M700

1. The +15, +10, −15 volt and D/A output monitor lines are measured with respect to analogue signal ground. The +5V Vcc monitor is measured with respect to Programme common.
   Note: these are monitor points only, and should be measured with a high impedance voltmeter. No significant current should be supplied to or drained from these points.
2. There are diodes in the relay circuits, so supplies for the relays should be of the correct polarity, otherwise damage will occur.
3. It is imperative that the edge connectors are correctly alligned, otherwise damage may occur to the instrument. Locating keys in the connector in position Z−22 ensures allignment.
4. The analogue signal ground is not at the same potential as the power output, so monitor and power outputs should not be linked.
5. Unless otherwise requested, the logic inputs are TTL compatible, sinking approximately 1mA to digital common with a logic 1 input.
6. Dual polarity units are normally in the positive output mode, until logic 1 is applies to the polarity line, or polarity relay energised.
7. A logic 1 on an override zero line will cause either the output to collapse to zero or the current limit to collapse to zero, without destroying previously stored information.
8. While logic 1 is present on the address line, the output/current limit will follow the demanded output, and stay at the last address demand.
9. On option 10, the limit address also controls the range change.

SECTION 4 : OPERATION

4:1 Operating notes

The M700 is despatched from the factory set up for immediate use.

Mains leads and power and sense leads are connected to the screw terminal barrier, and programme information fed to the programme connector(s).

The instrument is ready for use immediately the power relay is energised, but 5 minutes should be allowed for the instrument to attain a stable operating temperature.

To prevent ambiguous outputs from the unit at switch-on, the unit should be programmed at switch-on or prior to switch-on, no damage occurs to the input logic circuitry if correct logic levels are applied with instrument switched off.

The instrument is set up at 23 degrees C., so if the operating temperature is vastly different from this, it will need re-setting at the normal operating temperature if absolute accuracy is required.

The instrument can operate at full power up to 55 deg. C., except the 5V 10A unit, where the full current should not be drawn at less than 3.5V output for significant periods of time.

The amplitude information and limit/range information are stored independently in the instrument, so the same programme lines may be used for both functions, addressing each as required.

A free flow of air must be available at the front and rear of the instrument, to prevent overheating.

The case of the M700 is designed primarily for mounting in 19" rack shelves, retained with 10/32 bolts, which should not enter the chassis by more than ¼", otherwise damage will occur to the instrument. For bench use, self-adhesive feet should be stuck on the bottom of the chassis, for stability.

The current monitor output is set up for 1V output for full load current, monitored by a D.V.M., but may be used to drive a high resistance M.C. meter, taking into consideration the output impedance of approximately 1Kohm.

The current limit indicator is an electronic switch which indicates when the unit is operating under current limit/control conditions. The output is suitable for directly controlling a TTL gate. The switch is effectively a transistor (NPN) whose emitter is connected to programme common. The transistor is switched on under limit conditions. Do not exceed a supply of +30V for this switch.

On option 06 (only) the limit value can be overriden to full scale using only one programme line, without destroying previously stored limit information. Override 100% also overrides the override zero line. On option 05 this line overrides the limit to 96% of full scale limit.

At the time of writing, units with programmable limit have relay control on the limit D/A converter, though relay control from the amplitude (primary) connector may be accommodated on request, inequivalent positions.

Pin N of the limit connector is either a logic input for option 08 or a relay +Ve input for option 07.

Option 10: option 10 enables the unit to be switched electronically to four full scale ranges; line P controls one ratio switch, and R controls another, so the values of the full scale ranges are limited to a certain extent. A ratio worse than 1:100 is not recommended for the lowest to highest ranges, since the zero error, noise level and dynamic characteristics of the instrument apply to the highest range.

An example of ranges available is that of a ratio of 2:5 controlled by line P and 1:10 by R on a 50 volt unit:

P	R	Range	full scale output
0	0	1	2V
1	0	2	5V
0	1	3	20V
1	1	4	50V

ADJUSTMENT OF BASIC M700V

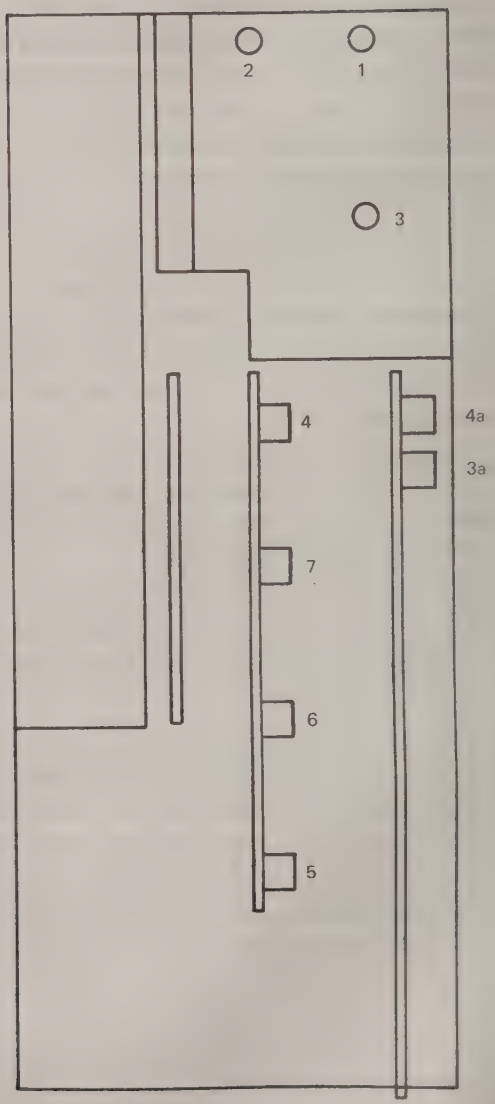
1. Set + 15V
2. Set + 10V
3. Set Zero

3a. Set Zero

4. Set FSD

4a. Set 1%

5. I Mon Zero
6. I Mon FSD
7. I Lim



4:2 ADJUSTMENTS : BASIC UNIT (AND 02, 03, 04)

Connect +S to +P and −S to −P allow 5 minutes to warm up.

1. Measure the +15 volt monitor output, and adjust to +15V within 10mV with (1).

2. Measure the +10 volt reference monitor output, and adjust to within 1mV with (2).

3. Programme zero output, and measure the output of the unit. Adjust to zero within 0.001% of the unit's full scale output using (3) or (3a) for option 02, 03, or 04.

4. Programme 100% output (0.2% and 0.8%) (options 03, 04) and adjust (4a) to double the error in output voltage, then re-adjust (3a) to re-establish the correct zero output (with zero programmed). Re-adjust (4a) and (3a) until the zero and 1% outputs are within 0.001% of the full scale output.

6. With zero current being drawn from the unit, adjust (5) for zero volts, within 1mV measured across the current monitor output.

7. Draw the specified rated current from the unit (with power leads simulating those expected in the system) and adjust (6) for 1V within 1% measured across the current monitor output.

8. With the same power leads, adjust (7) for the required steady state current limit. Do not set to more than 20% above the rated output current.

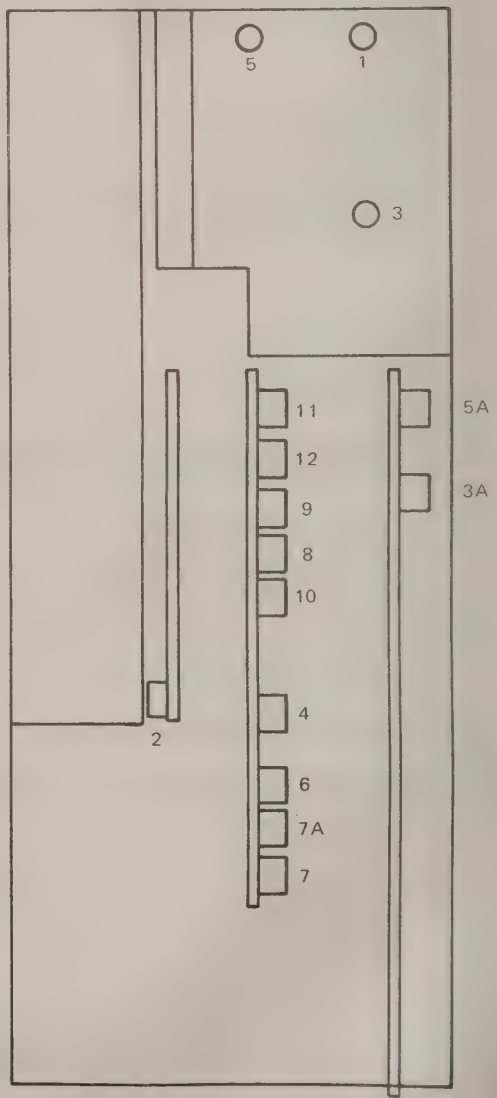
9. The above three adjustments may interact, so repeat 6, 7 and 8 as necessary.

10. Repeat all measurements and re-adjust as necessary.

ADJUSTMENT OF DUAL POLARITY UNIT M700V (OPTION 03/04, 08)

+ POL 100%

1. Set +15V
2. Set Common mode voltage
3. Set Zero
3a Set Zero
4. + Pol Zero
5. Set +10V (100% + Pol)
5a Set 1%
6. - Pol Zero
7. - Pol 100%
7a - Pol 1%
8. I Mon 0
9. I Mon +
10. I Mon -ve Pol
11. I. Lim
12. I. Lim Bal.



4:3 ADJUSTMENTS : OPTION 08 (AND 02, 03, 04)

Connect +S to +P and −S to −P, allow 15 minutes warm-up.

1. Measure the +15 volt monitor output, and adjust to 15V within 10mV with (1).

2. Programme zero output and measure the voltage between +S and analogue power ground. Adjust (2) to the following voltages:
   10V unit; 8V, 25V unit : 14.6V
   50V unit: 27.5V, 100V unit : 52.5V

3. Measure the D/A converter output monitor, and adjust to zero within 0.1mV with (3) or (3a) for options 02, 03 or 04.

4. Measure the zero output of the unit with zero programmed, positive polarity, and adjust to zero within 0.001% of the full scale output of the unit, with (4).

5. With 100%, positive polarity programmed, adjust the output to within 0.01% with (5).

6. (Option 03 or 04) Programme 1% output (0.2% and 0.8%) positive polarity, and adjust (5a) to double the error in the output. Re-adjust (3a) to re-establish the correct zero output. Repeat the 1% and zero adjustments until the 1% and zero outputs are within 0.001% of the full scale output of the unit.

7. Programme zero output, negative polarity, and adjust the output to zero within 0.001% of the full scale output with (6).

8. Programme 100%, negative polarity, and adjust the output to within 0.01% with (7).

9. Programme 0.2% and 0.8%, negative polarity, and adjust (7a) if present, for 1% output, within 0.001% of the full scale output of the unit.

10. With zero current drawn from the unit, measure the current monitor output, and adjust to zero, within 1mV, with (8).

11. With 50% voltage programmed, draw the specified rated current from the unit on positive polarity, and adjust (9) for 1V within 0.3% current monitor output. Repeat on negative polarity, adjusting (10).

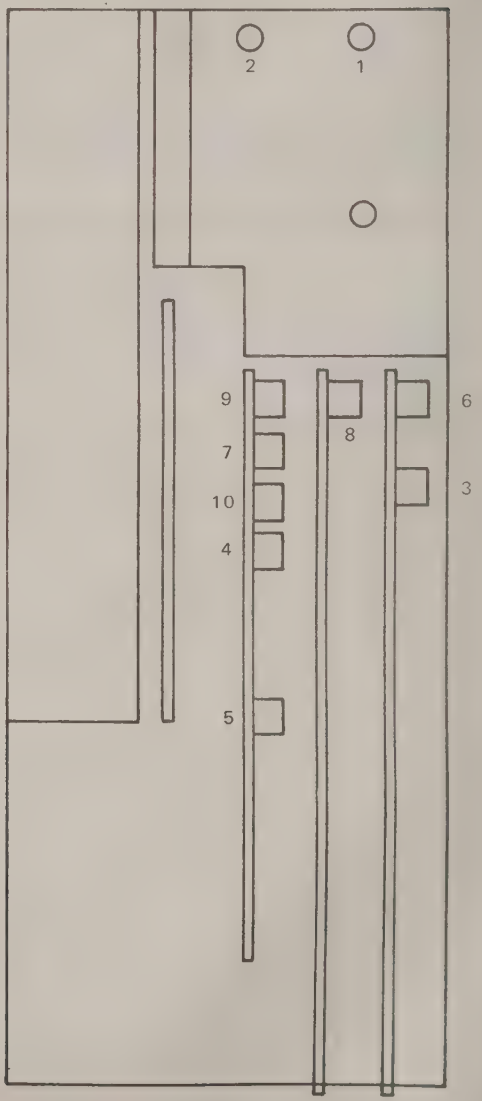
12. Adjustments (8) (9) (10) interact, so re-adjust as necessary.

13. On positive polarity, adjust (11) to limit the output current to the required value, and adjust (12) to equalise the positive and negative output currents (if required). Do not adjust the current limit to above 20% over the rated output of the unit.

14. Repeat all the measurements and re-adjust as necessary.

ADJUSTMENT OF M700V (OPTION 05/06) (AND 03/04)

1. Set +15V
2. Set +10V
3. D/A Zero
4. O/P Zero
5. O/P 100%
6. 1%
7. Limit Zero
8. Monitor Zero
9. 100% Limit
10. 100% Monitor



4:4 ADJUSTMENTS : OPTION 05/06 (AND 03/04)

Connect +S to +P and –S to –P, allow 15 minutes warm-up.

1. Measure the +15V monitor output, and adjust to +15V within 10mV with (1).

2. Measure the 10V reference monitor output, and adjust to +10V within 0.1mV with (2).

3. With zero output programmed, measure the D/A output monitor output and adjust to zero within 0.1mV with (3).

4. With zero output programmed, measure the output of the unit, with 100% current limit programmed. Adjust to zero within 0.001% of the full scale output of the unit with (4).

5. Programme 100% voltage, 100% current limit, and set the output of the unit to within 0.01% with (5).

6. Programme 0.2% and 0.8% output, 100% current limit and adjust (6) to double the error of the 1% output voltage. Re-adjust (3) to re-establish the zero output. Repeat the adjustment of (6) and (3) until the zero output and 1% output are within 0.001% of the full scale output of the unit.

7. Programme 50% output voltage, zero current limit, and adjust (7) to reduce the output current available from the unit to less than 0.005% of the rated current of the unit.

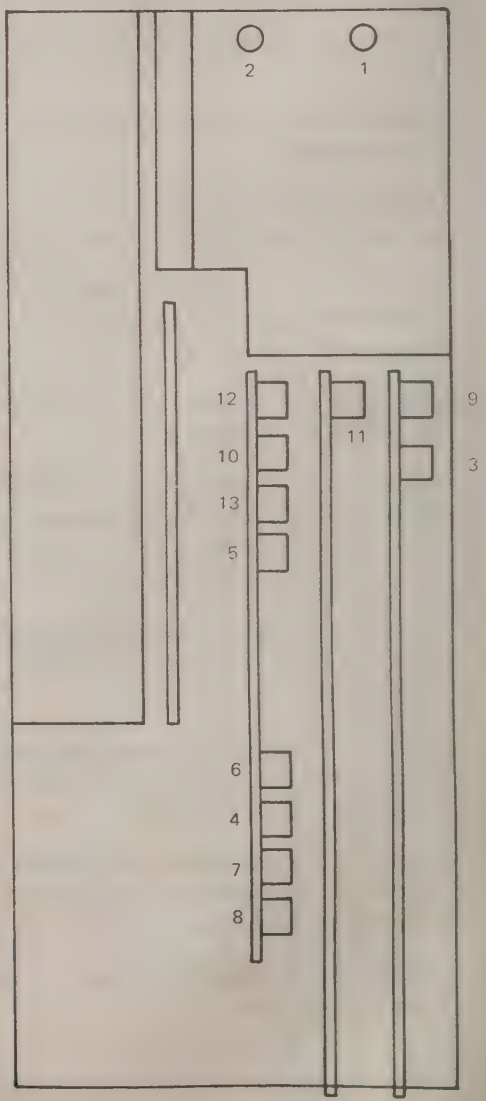
8. With the same conditions, measure the current monitor output, and adjust to zero within 1mV with (8). Re-adjust (7) and (8), until both the output current and monitor are zeroed.

9. Programme 100% current limit, and measure the current available from the unit, and adjust to the full rated current (– .25% to allow for the hysteresis in the limit circuitry) with (9).

10. With the same conditions, adjust (10) for a current monitor output of 0.9975V within 0.5%.

ADJUSTMENT OF M700V (OPTIONS 03/04, 05/06, AND 10)

1. +15V
2. +10V
3. Zero 1
4. Zero 2
5. Zero 3
6. Set O/P
7. Ratio 1
8. Ratio 2
9. 1%
10. Limit Zero
11. Monitor Zero
12. 100% Limit
13. Monitor FSD



4:5 ADJUSTMENTS : OPTION 03/04, 05/06 AND 10

Connect +S to +P and −S to −P, allow 15 minutes warm-up.

1. Measure the +15V monitor output, and adjust to +15V within 10mV with (1).

2. Measure the +10V reference monitor output, and adjust to a +10V within 1mV with (2).

3. Programme zero output voltage, 100% current limit, and range line R (range 3 or 4). Adjust (3) for the **same** zero output from the unit with range line P at 0 and 1 (i.e. adjust (3) for the same zero output on ranges 3 and 4).

4. Similarly, with range line P at 0, adjust (4) for the same zero output from the unit with range line R at 0 and 1 (i.e. adjust (4) for the same zero output on ranges 1 and 3).

5. With range lines P and R selected, adjust (5) for zero output, within 0.001% of the full scale output of the unit.

6. Programme through all four ranges, and re-check the zero outputs on all ranges, re-adjusting as necessary.

7. Programme range line P and not R (range 2) and 100% output voltage and 100% current limit.
   Adjust (6) for the correct specified output from the unit within 0.01%.

8. Similarly adjust (7) for the correct output within 0.01%, with range lines P and R programmed (range 4).

9. Similarly adjust (8) for the correct output within 0.01%, with range line R and not P programmed (range 3).

10. Programme through all four ranges, and re-check zero and 100% outputs, and re-adjust as necessary.

11. Programme 0.2% and 0.8% output voltage and range lines P and R. Measure the 1% output, and adjust (9) to double any error, re-adjusting (3) to re-establish the correct zero output. Repeat the adjustment of (9) and (3), until the zero and 1% outputs are within 0.001% of the full output of the unit.

12. Re-check zero, 1% and 100% outputs on all four ranges.

13. Programme 50% output voltage, zero current limit. Measure the current available from the unit, and adjust to less than 0.005% of the rated output current of the unit, with (10).

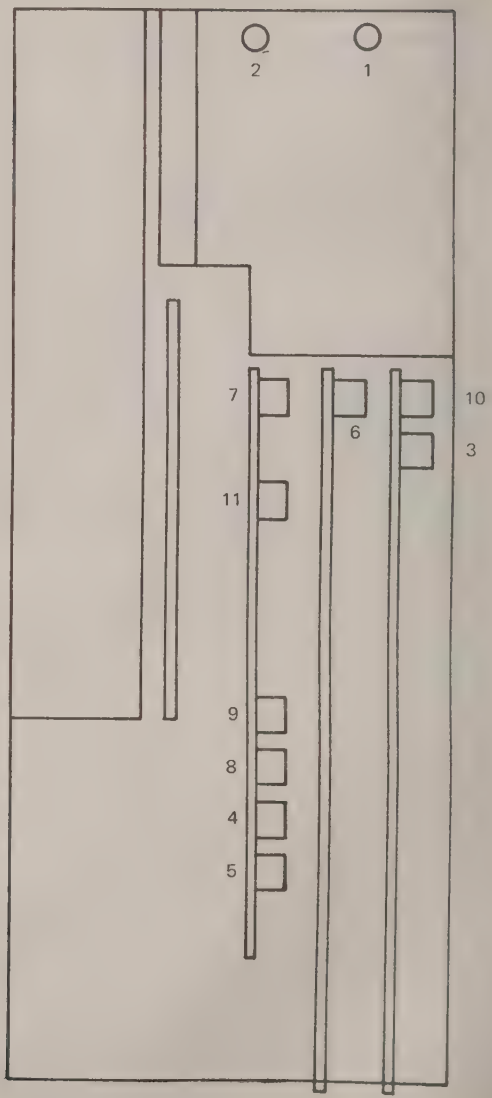
14 With the same conditions, measure the current monitor output, and adjust to zero, within 1mV with (11). Re-adjust (10) and (11), until both the output current and current monitor are zeroed.

15. Programme 100% current limit, and measure the current available from the unit. Adjust to the full rated current (-0.25%, to allow for the hysteresis in the limit curcuitry) with (12).

16. With the same conditions, adjust (13) for a current monitor output of 0.9975V within 0.5%.

ADJUSTMENT OF M700 I (OPTIONS 03/04, 05/06)

1. +15V
2. +10V
3. D/A Zero
4. O/P Zero
5. O/P FSD
6. Limit Zero
7. Limit FSD
8. I. Mon Zero
9. I. Mon FSD
10. 1% ADJ
11. Response



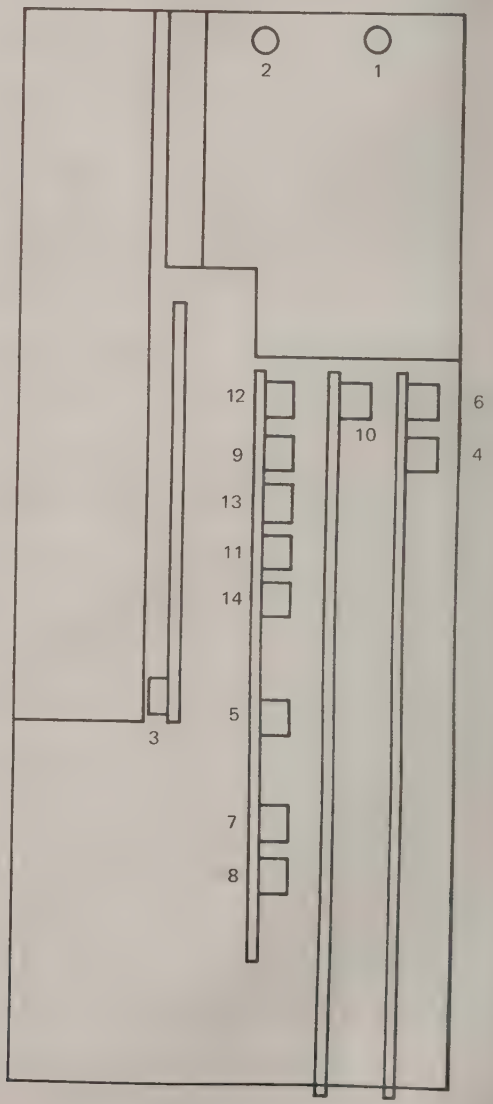
4:6 ADJUSTMENTS : OPTIONS 03/04, 05/06

Connect +S to +P and –S to –P, allow 15 minutes warm-up.

1. Measure the +15V monitor output, and adjust to +15V within 10mV with (1).
2. Measure the +10V reference monitor output, and adjust to +10V within 1mV with (2).
3. Programme zero output current and 100% voltage limit, measure the D/A output monitor output, and adjust to zero within 0.1mV with (3).
4. With the same conditions, measure the output current from the unit, and adjust to less than 0.001% of the full scale output current of the unit, with (4).
5. With 100% current output programmed, and 100% voltage limit, measure the current available from the unit, and adjust to the rated output within 0.05% with (5).
6. With an open circuit on the output of the unit, programme 100% current, zero voltage limit, and adjust (6) for zero output voltage within 0.05% of the rated output.
7. Similarly, with 100% voltage limit programmed, adjust (7) for the rated output voltage (-0.25%, to allow for the hysteresis in the limit circuitry).
8. If current monitor is selected, adjust (8) for zero current monitor output, within 1mV, with an open circuit on the output, and adjust (9) for a current monitor of 1V within 0.5%, with a short across the output of the unit and 100% current programmed.
9. With 100% voltage limit and 0.2% and 0.8% current programmed, adjust (10) to double the error in the output current available from the unit. Re-adjust (3) to re-establish the correct D/A output zero. Repeat these adjustments until the zero and 1% output currents are within 0.001% of the full output current of the unit.
10. Adjust (11) for a smooth output response waveform, as the current is programmed from zero to 100% and back to zero.
11. Re-check all measurements, and adjust as necessary.

ADJUSTMENT OF M700 (OPTIONS 03/04, 05/06 AND 08)

1. +15V
2. +10V
3. Common Mode
4. O/P Zero
5. + O/P FSD
6. 1%
7. -Ve O/P Zero
8. -Ve O/P FSD
9. I.Mon Zero
10. Limit Zero
11. Limit Balance
12. Limit FSD
13. Monitor FSD
14. Response



4:7 ADJUSTMENTS : OPTION 03/04, 05/06 AND 08

Connect +S to +P and −S to −P, allow 15 minutes warm-up.

1. Measure the +15V monitor output, and adjust to +15V within 10mV with (1).

2. Measure the +10V reference monitor output, and adjust to +10V within 1mV with (2).

3. With 100% current limit and zero output volts programmed, measure the voltage between T.P.1 and −S terminal, and set to the following with (3):
   10V unit : 8V, 25V unit : 14.7V
   50V unit : 27.5V, 100V unit : 52.5V

4. Measure the output voltage and adjust to zero within 0.001% of the full scale output of the unit with (4). (On positive polarity).

5. Programme 100% output voltage, 100% current limit, positive polarity, and adjust output voltage to within 0.01% with (5).

6. Programme 0.2% and 0.8% output voltage, and adjust (6) to double the error in the output voltage, re-adjust (4) to re-establish the correct zero output. Repeat adjustments of (6) and (4), until the zero and 1% outputs are both within 0.001% of the full output voltage of the unit.

7. Programme zero output volts, negative polarity, and adjust the output to zero within 0.001% of the full scale output of the unit with (7).

8. Programme 100% output voltage, negative polarity, and adjust the output to within 0.01% with (8).

9. With the output terminals open circuited, measure the current monitor output, and adjust to zero within 1mV with (9).

10. Programme 100% output voltage, zero current limit. Measure the current available from the unit, on positive polarity, and adjust to zero within 0.005% of the rated output current of the unit with (10).

11. Programme 100% output voltage, 1% current limit, and measure the current available from the unit. Adjust (11) to equalize the current available in the positive and negative output modes.

12. Programme 100% output voltage, 100% current limit, and measure the current available from the unit (positive polarity). Adjust the current to the rated current of the unit (-0.25%, to allow for the hysteresis in the limit circuitry) with (12).

13. With the same conditions, measure the current monitor output, and adjust to 0.9975V within 0.5% with (13).

14. Chop the output alternatively from zero to 100%, and adjust (14) for a smooth output response from the unit.

15. Repeat all measurements, and re-adjust as necessary.

REL Industrial Ltd.

WARRANTY

REL Industrial Ltd instruments are warranted during a period of one year from date of shipment to original purchaser to be free from defects in material and workmanship. The liability of Seller under this warranty is limited to replacing or repairing any instrument which is returned by Buyer, at his expense, during such period and which has not been subjected to misuse, neglect, improper installation, repair, alteration, or accident. Seller shall have the right to final determination as to the existence and cause of a defect. In no event shall Seller be liable for consequential damages. This warranty is in lieu of any other warranty expressed, implied, or statutory; and no agreement extending to modifying it will be binding upon Seller unless in writing and signed by a duly authorised officer. Every REL Industrial Ltd instrument is carefully inspected and is in perfect working order at the time of shipment. Each instrument should be checked as soon as received. If the unit is damaged in any way, or fails to operate, a claim should be filed within three days of delivery to both the transportation company, and to REL Industrial Ltd with the full details of such failure and action taken with transportation company. Non delivery must be notified to us within 15 days of invoice date.

REPAIRS

A comprehensive instrument repair and service facility is available at our manufacturing plant. Authorisation should be obtained to return an instrument for service before returning same. Please ensure that the instrument is returned with comprehensive fault description attached.

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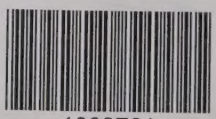

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